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(72) and (74) continued overleaf

(54) Traffic signals

(57) A traffic signal has areas 110A, 110B, 110C for respective directions, each controllable to any of three colours.

FIG. 8

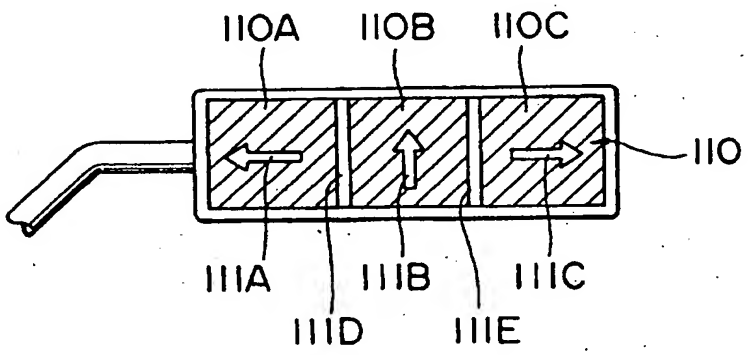

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FIG. 1

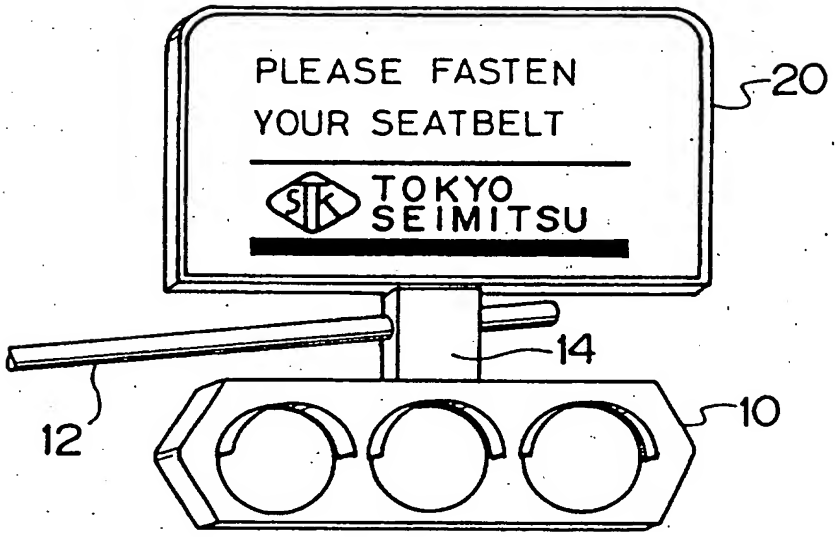


FIG. 2

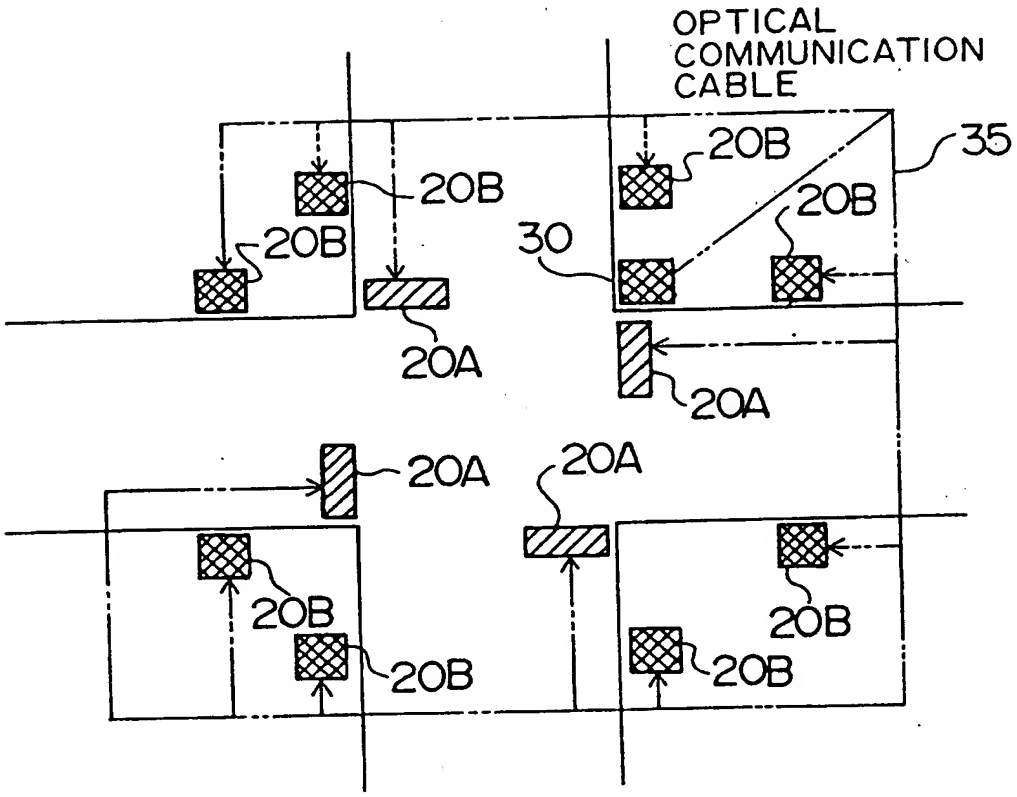

OPTICAL
COMMUNICATION
CABLE
20B
20B
20A
20B
30
35
20B
20A
20A
20A
20B
20B
20B
20B

FIG. 3

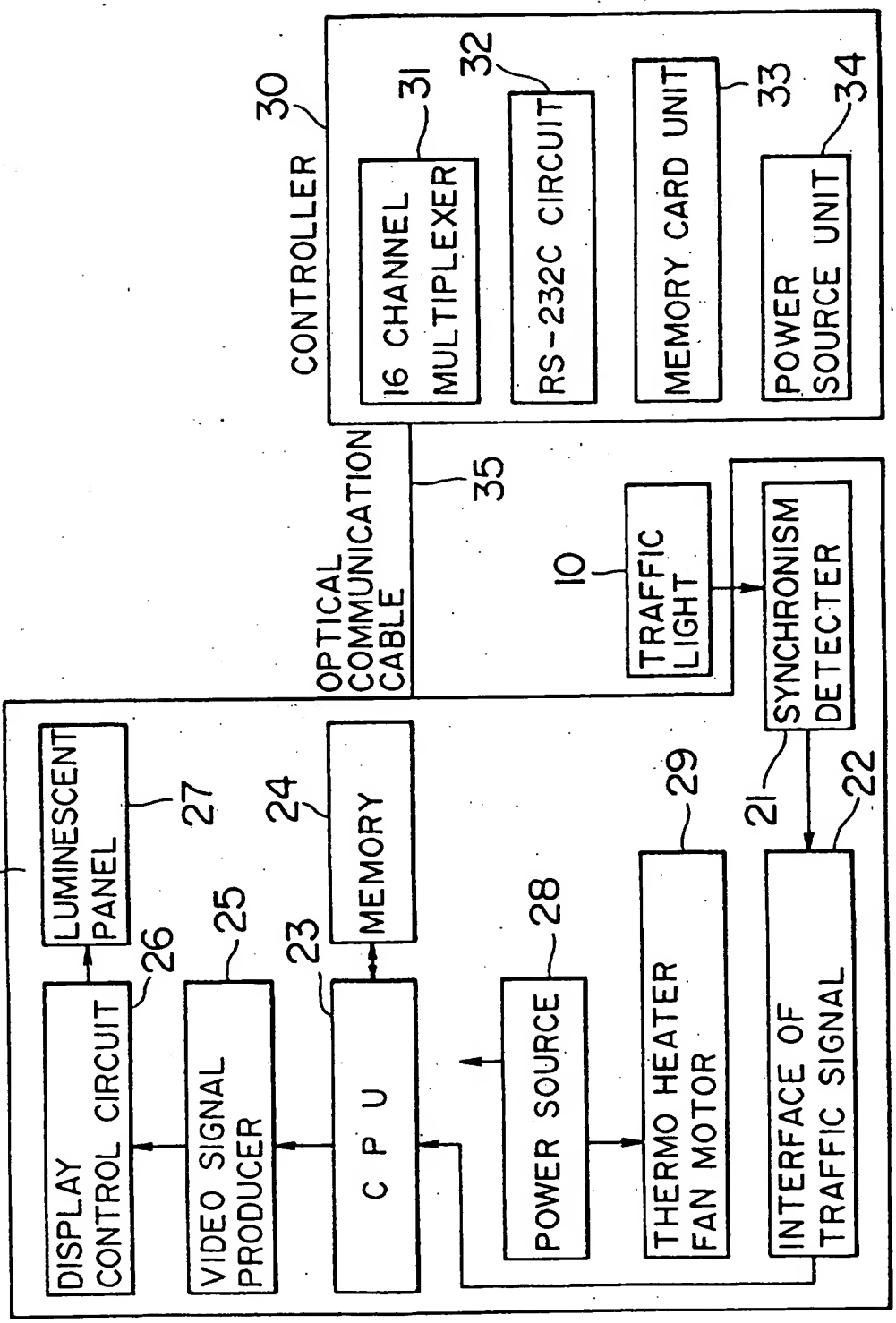


FIG. 4

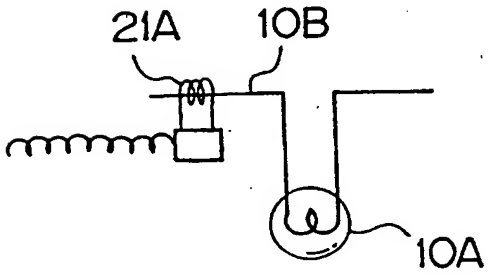


FIG. 5

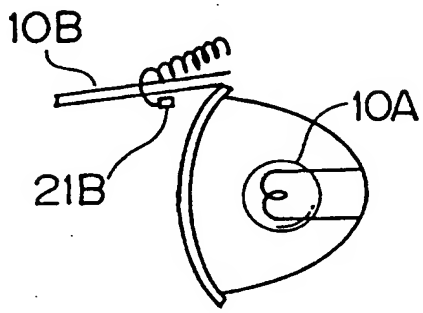


FIG. 6

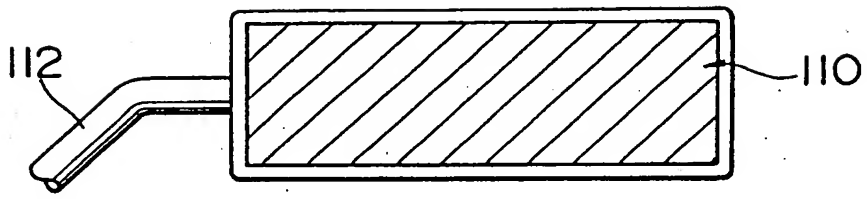


FIG. 7

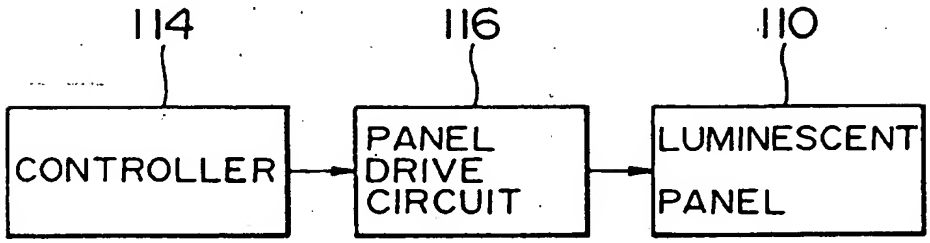


FIG. 8

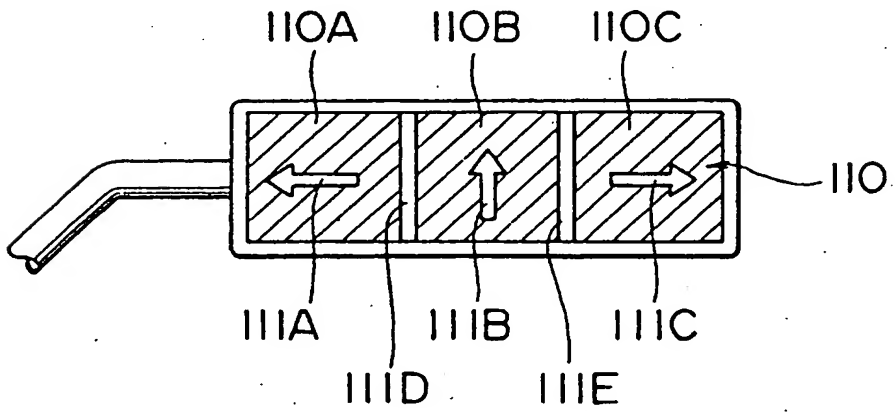
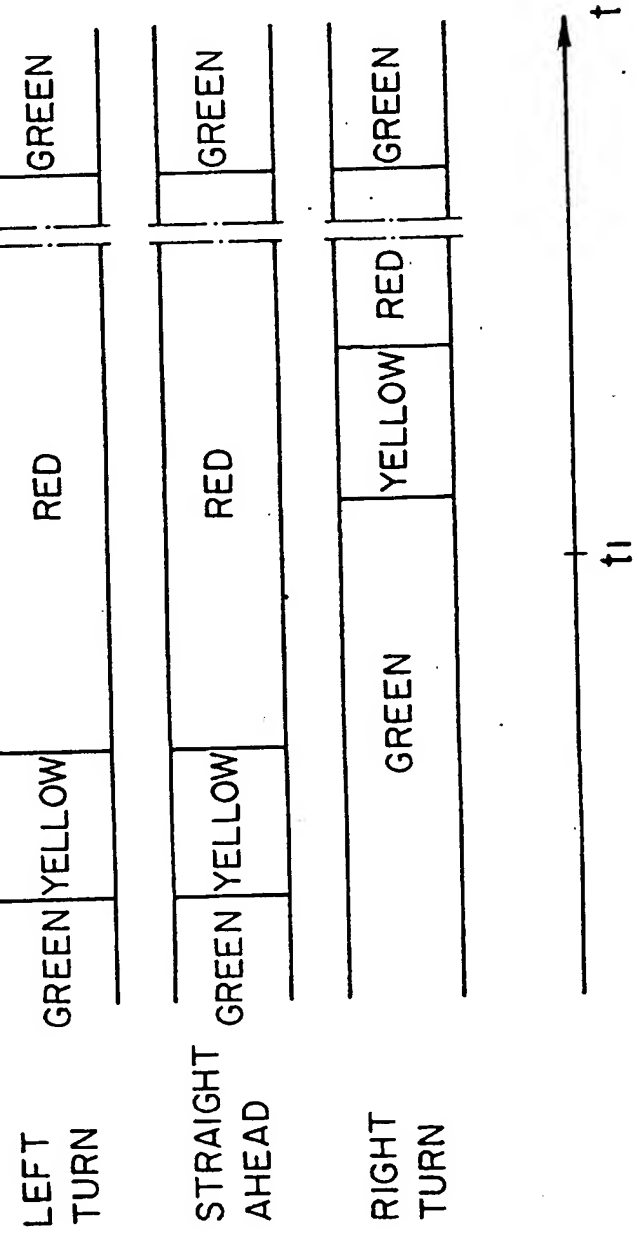


FIG. 9


LEFT TURN
STRAIGHT AHEAD
RIGHT TURN
GREEN
YELLOW
RED
GREEN
YELLOW
RED
GREEN
YELLOW
RED
GREEN
t
t1

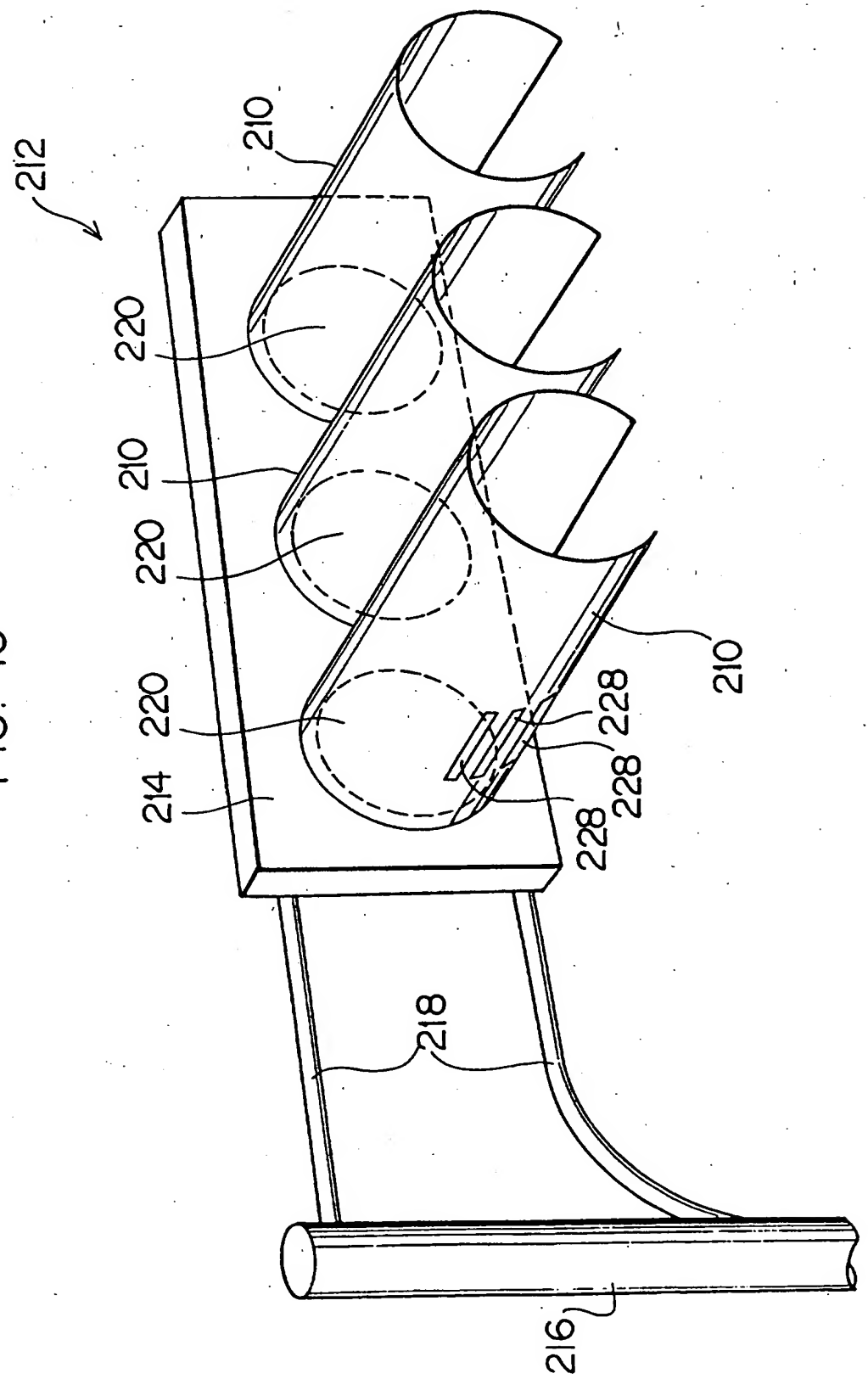


FIG. 10

FIG. 11

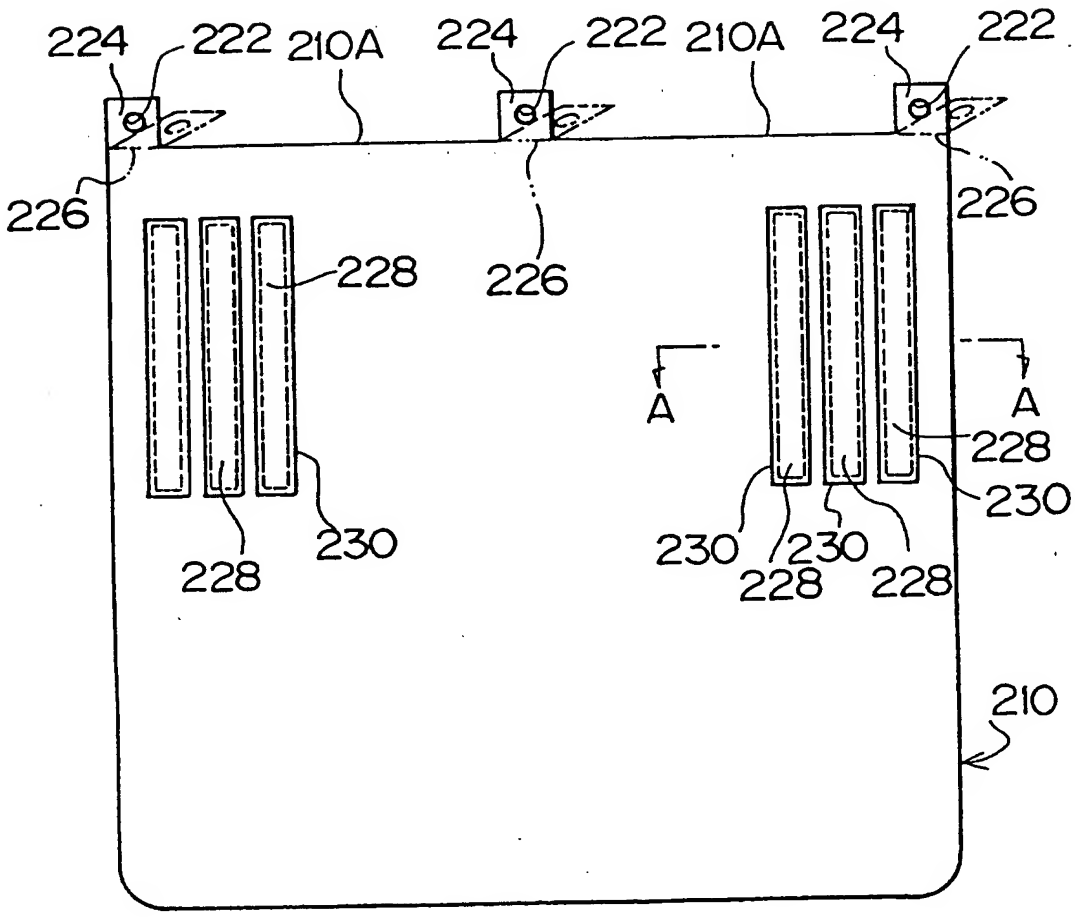

224
222
210A
224
222
210A
224
222
226
226
226
228
228
230
228
230
A
A
230
230
228
228
230
210

FIG. 12

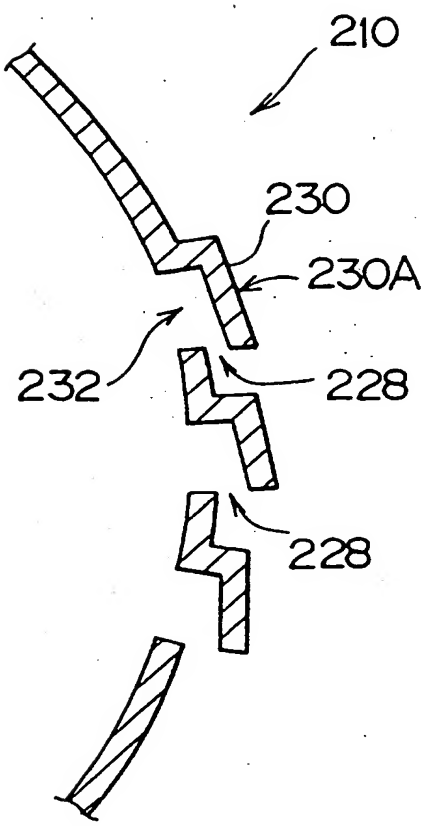


FIG. 13

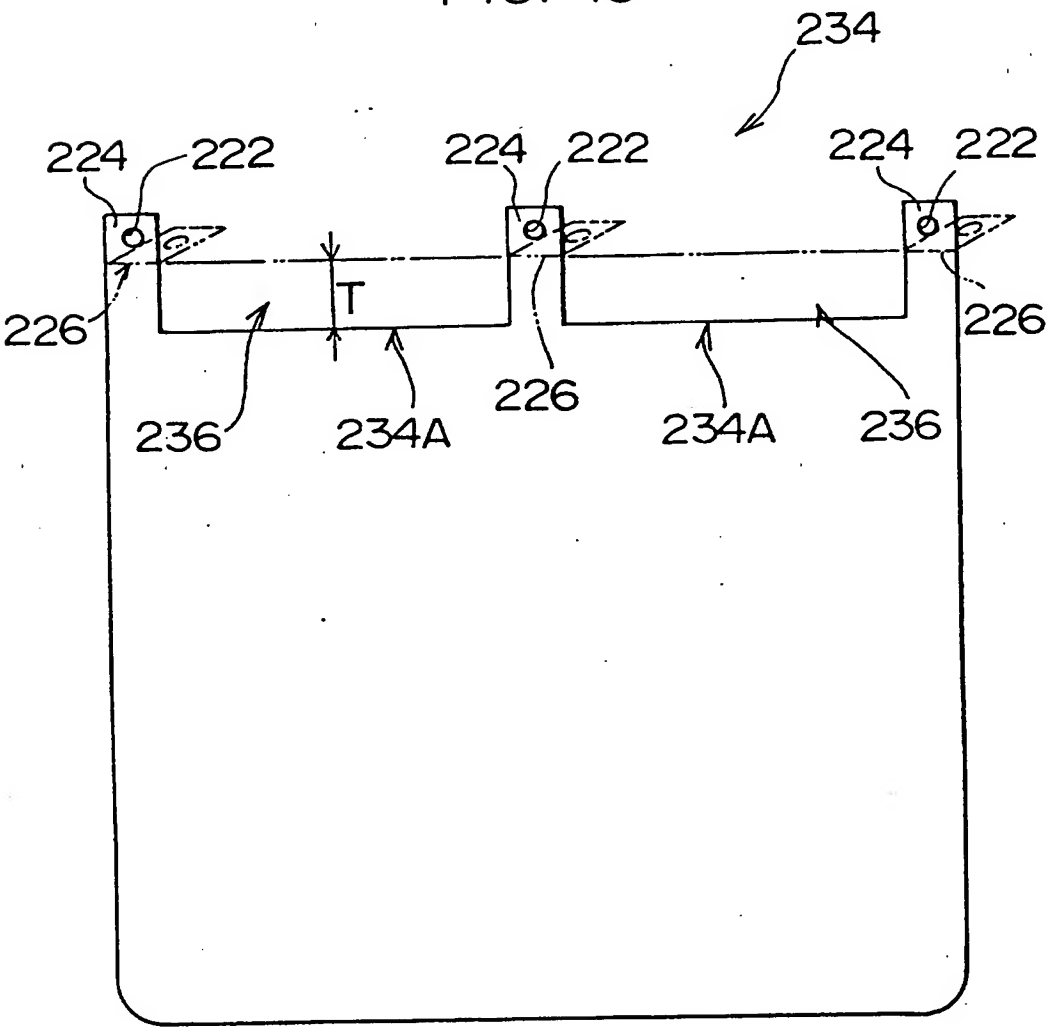


FIG. 14

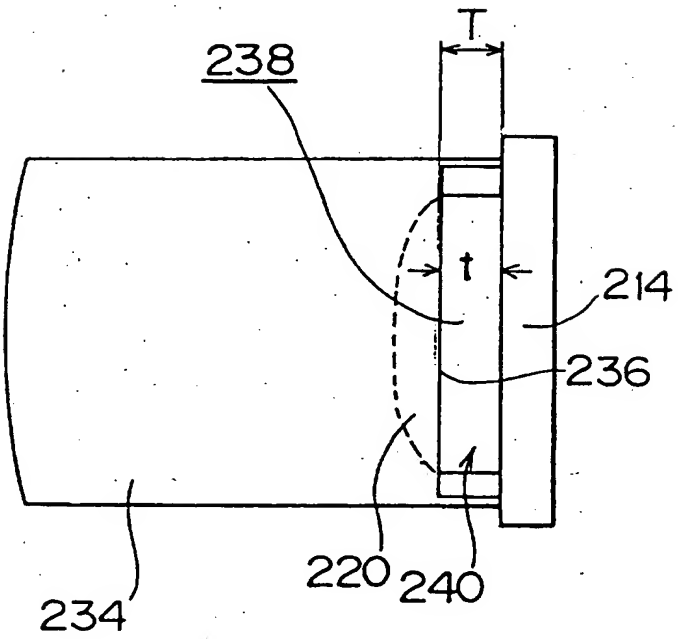


FIG. 15

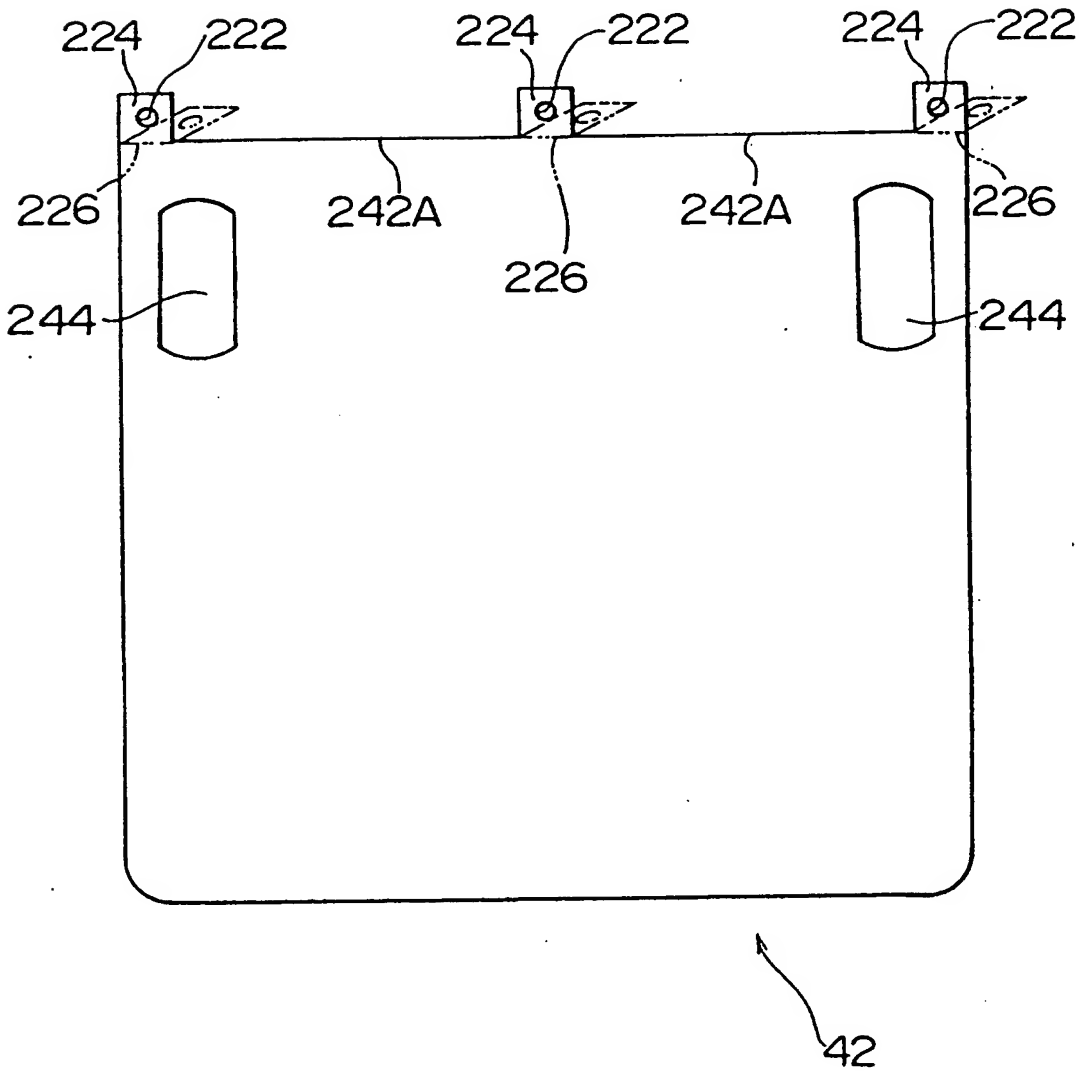


FIG. 16

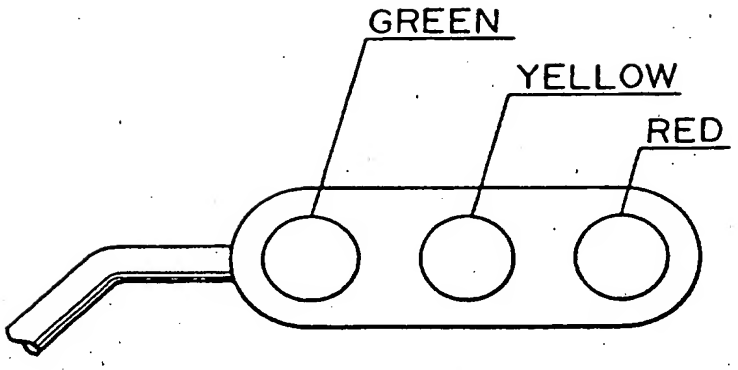
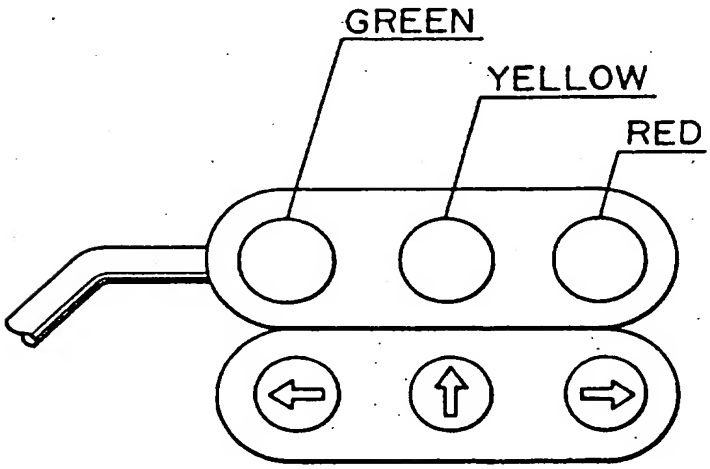


FIG. 17



TRAFFIC SIGNALS

This invention relates to traffic signals and in particular, but not exclusively to display systems and lamp hoods thereof as well as traffic signals per se.

A traffic signal aims to make the flow of cars and people smooth and to prevent traffic accidents. Accordingly, in a known traffic signal, such as shown in Fig. 16, three lights (green, yellow and red lights) are time-controlled to light one by one. Moreover, a display board, which displays the name of the place where the traffic signal is situated and an advertisement, is installed on the top, bottom or side portion of the traffic signal.

With such known display boards, the information displayed thereon can be easily seen during the day by virtue of sunlight. However, there is the problem that the information on the display board becomes difficult to see when it is dark ie. at night-time. Moreover, there is the additional problem that it can be difficult for drivers and pedestrians to determine which light is on during the day due to the sunlight.

Fig. 17 shows another known traffic signal, which displays a green arrow mark at the bottom thereof, and lights the red light and the relevant green arrow mark to show that traffic can only move in the direction indicated by the arrow mark.

However, the above-mentioned conventional traffic signal has the problem in that it is not easy for drivers and pedestrians to see the signal light because of the influence of the sunlight occasionally. Moreover, the traffic signal shown in Fig. 17 has the disadvantage that identifying the direction in which traffic can move is complex since the relevant green arrow mark must be interpreted in conjunction with other green, yellow and red signal lights. Additionally it is

not easy to see the arrow mark and the direction which the arrow mark indicates.

Known hoods for traffic signal lights are installed in the display board of the traffic signal. These hoods are mounted around the lenses for the red, green and yellow lights and are formed like brims to prevent the reflection of sunlight on the lenses and to improve visibility. Moreover, the hood may be formed as an elongated cylinder (double hood or cylindrical hood) for each light of the traffic signal. This hood which is formed as an elongated cylinder can prevent pedestrians and drivers from seeing traffic signals when at oblique directions to the signal thus being a safety risk.

Where a hood is formed as an elongated cylinder for the light of the traffic signal, there is the risk that if the wind blows in the direction of the lens, it will be trapped around the lens increasing the wind pressure applied to the hood. Therefore, there is the problem that the traffic signals are damaged and bent by said wind pressure.

According to a first aspect of the invention there is provided a display system for a traffic signal, comprising:

a display means arrangeable at a position in which the display means can be observed substantially simultaneously with the traffic signal, for displaying information such as traffic information, traffic slogans, advertisements or the like;

detection means for detecting whether at least one lamp of the traffic signal is on or off, without changing an electric circuit of said traffic signal; and

means for changing the display means in synchronisation with said at least one lamp in response to the state detected by said detection means.

Embodiments of the invention are thus able to provide a display system for a traffic signal which drivers and pedestrians can easily see and identify a

signal color, improving safety. Furthermore, traffic information can be given as well as traffic slogans or advertisements.

In one embodiment, the display means is provided at a position for easy observation simultaneously with the traffic signal. Information including traffic information, traffic slogans, advertisements and the like, and/or the background of said information, are changed over to the same color as the traffic signal. The states of the respective lamps are detected without changing an electric circuit of the traffic signal. The luminescent colors in the display means are then changed over to the same color as the traffic signal in response to an output signal generated by the detecting means. Therefore, the signal color can be determined not only by the signal lamp but also by the display color of the display means and various information displayed on the display means can be seen simultaneously. The electric circuit of the traffic light is not modified, so that the safety of the traffic signal can be secured.

In another embodiment the display means is provided at a position for easy observation simultaneously with the traffic signal. Information such as traffic information, traffic slogans and advertisements, and/or the background of said information, which are displayed on this display device, are changed over from on to off or vice versa in synchronism with the red lamp. The state of the red lamp ie. whether it is on or off is detected without changing the electric circuit of the traffic signal. The display means is made luminescent in red only when the red-lamp state is detected to be on based on the output of the detecting means. The display means is made to be off when another lamp is turned on. Therefore, the red signal can be determined not only by the signal lamp but also by the display color of the display means and various information displayed on the display means can be seen simultaneously. Moreover, the

states of the respective lamps are detected without changing the electric circuit of the traffic signal, that is, the electric circuit is not modified, so that the safety of the traffic signal can be secured.

According to a second aspect of the invention, there is provided a traffic signal comprising:

surface luminescent means, in which the surface as a whole is one of at least three colors including green, yellow and red and is luminescent; and

luminescent control means for changing the luminescent surface as a whole of said surface luminescent means to green, yellow and red successively with a predetermined timing.

In yet another embodiment of the invention, the whole luminescent surface of the surface luminescent means is changed over to green, yellow and red successively in a predetermined timing. Thus, the luminescent area is extended and the visibility is improved as compared to a conventional traffic signal of the same size.

According to a third aspect of the invention, there is provided a traffic signal comprising:

surface luminescent means, in which the whole luminescent surface is divided into a plurality of surfaces, at the center portions of the respective luminescent surfaces, there being an arrow mark for indicating the direction of travel permitted, the backgrounds of said arrow marks being changeable to three luminescent colors comprising green, yellow and red; and

luminescent control means for successively changing the luminescent colors of the backgrounds of the surfaces to green, yellow or red.

According to an embodiment of this invention, the luminescent surface of the surface luminescent means is divided into the number of the lanes on the road or into three surfaces for a left-turn, straight ahead and a

right-turn. On the respective luminescent surfaces, there is displayed arrow marks indicating a left-turn, straight ahead and an arrow mark indicating a right-turn. The backgrounds of the arrows can be changed between three colors including green, yellow and red successively with a predetermined timing. Therefore, when only a specific lane or a specific direction can proceed, the luminescent surface which corresponds to the lane or the direction is made green and the other luminescent surfaces which correspond to other lanes or directions are made red, so that this kind of display is simple and easy to see.

Thus, embodiments of the invention can provide a traffic signal wherein the complex display of the conventional traffic signal using arrow marks can be simplified and easily seen, and visibility and safety can be improved.

According to a fourth aspect of the invention, there is provided a hood for a lamp of a traffic signal mounted around the signal lamp for shield light, wherein ventilating openings for passing the air are formed in said hood.

Thus embodiments of the invention are able to provide a hood for a lamp of a traffic signal which can prevent the traffic signal from being damaged by the wind pressure.

Thus when the wind blows in the direction toward the display part of the traffic signal, it can leave the hood via the ventilation openings. Accordingly, since the wind is not trapped around the display part, the traffic signal is not damaged and bent by the wind pressure.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings in which:

Fig. 1 shows a display system for a traffic signal embodying this invention;

Fig. 2 shows schematically a crossroads along with TS (traffic safety) panels and a controller;

Fig. 3 shows a block diagram illustrating the construction of a TS panel and a controller;

Fig. 4 shows a detector for use with the embodiment of Fig. 3;

Fig. 5 shows another detector for use with the embodiment of Fig. 3;

Fig. 6 shows another embodiment of a traffic signal according to this invention;

Fig. 7 is a block diagram of the control for a TS panel;

Fig. 8 shows another embodiment of a traffic signal according to this invention;

Fig. 9 is a timing chart showing an example of the change-over timing of the green, yellow and red lights of a traffic signal;

Fig. 10 is a view of a traffic signal with lamp hoods embodying the present invention;

Fig. 11 is a view of one of the hoods of Fig. 10 when flat;

Fig. 12 is a view of a part of the hood of Fig. 10, along line A-A of Fig. 11, when installed on a display board;

Fig. 13 is a view of another hood embodying the present invention, when flat;

Fig. 14 is a side view showing the hood of Fig. 13 when on the display board;

Fig. 15 is a view of a further hood embodying the present invention, when flat;

Fig. 16 is a view of a first conventional traffic signal; and

Fig. 17 is a view of a second conventional traffic signal.

First, a detailed description will be given of one embodiment of a display system for a traffic signal. Fig. 1 shows a traffic safety panel 20 (hereafter

referred to as a TS panel) which comprises the display system for the traffic signal and is mounted thereon. The traffic signal 10 which consists of three colors including green, yellow and red is attached to a support pole 12 extending from an electric pole (not shown) downward through a bracket 14.

TS panel 20 is a color plasma display panel. This TS panel 20 is installed on the upper part of the traffic signal 10 through bracket 14 and can be thus observed simultaneously with the traffic signal 10.

At an intersection of a crossroad as shown in Fig. 2, for instance four TS panels 20A are attached to traffic signals for the roads and eight TS panels 20B are attached to traffic signals for pavements. Thus, there are in total twelve TS panels. The twelve TS panels 20A and 20B are controlled simultaneously by a controller 30 (Fig. 3) through optical communication cables 35 to control the display patterns of panel surfaces.

Fig. 3 is a block diagram showing one embodiment for the internal structure of a TS panel and a controller. The TS panel 20 consists mainly of a synchronisation detector 21, a central processing unit (CPU) 23, a memory 24, a video signal producer 25, a display control circuit 26 and a luminescent panel 27. The controller 30 comprises a 16-channel multiplexor 31, a RS-232C circuit 32 for optical communication, a memory card unit 33 and a power source unit 34 as shown in Fig. 3. The controller 30 is operated when the display patterns such as traffic information, a traffic slogan or the advertisements displayed on the TS panel 20 are to be changed and the memory cards for the memory card unit 33 are replaced. Thus, the display pattern data recorded in the memory card is read and transmitted to the respective TS panels 20 through the RS-232C circuit 32, the 16-channel multiplexor 31 and an optical communications cable 35.

The display pattern data transmitted from the controller 30 is memorized in the memory 24 via an interface, not shown, for the optical communication with the TS panel 20, through the CPU 23.

Synchronisation signals are transferred from the synchronisation detector 21 to the CPU 23 of the TS panel 20 via a signal interface 22. This synchronisation detector 21 comprises a detector next to each color lamp of the traffic signal 10, to output a signal indicative of the state of each lamp ie. whether it is turned on or turned off. The detector 21 is not electrically connected to an electric circuit of the traffic signal 10.

Fig. 4 shows an example of a synchronisation detector 21 in which a coil 21A is wound around a lead 10B which provides the current to light a lamp 10A of the traffic signal. The magnetic field produced by the electric current flowing when the lamp is turned on is converted into an electric signal. A second type of detector is shown in Fig. 5 and comprises a photo sensor 21B (eg. a photocell) which is disposed opposite each lamp 10A of the traffic signal and converts the light when the lamp is turned on into an electric signal. A sunshade cover 10B is provided for the lamp shown in Fig. 5.

As can be seen in Fig. 3, the CPU 23 outputs video signals to the display control circuit 26 via the video signal producer 25 to provide, for example, advertisement characters and luminescent patterns in a white color on a luminescent background which is the same color as the lamp of the traffic signal which is on. This is determined by the synchronisation signal which can be added to the display pattern data memorized in the memory 24 via the signal interface 22. This signal indicates the color of the lamp which is turned on at that time. A heater and a fan heater 29 are driven by the power source 28 to keep the temperature

for using the TS panel 20 in the range 0°C-45°C. Moreover, the power source 28 also supplies the power to respective circuits of the TS panel 20.

With the above-mentioned arrangement, the advertisement characters, the patterns and the like are made luminescent in a white color and the background is changed to have the same color as the traffic signal in synchronisation with the change-over thereof. The TS panel 20 can provide various information to drivers and pedestrians and the whole display panel thereof can be changed over to be made luminescent in the same color as the signal. Therefore, it can function as an auxiliary signal which can be easily observed even from far away. Moreover, this TS panel 20 is installed completely separately from the electrical system of the traffic signal. Therefore, the reliability of the traffic signal is not lost.

Whilst the description has been of an embodiment where the TS panel is composed of a color plasma display panel which is able to change its display patterns, the present invention is not necessarily limited to this. For example, the TS panel may be composed of a display board formed with materials having the light permeability and with characters, figures and the like thereon to illuminate it simultaneously with three color lights of a traffic signal including a green, yellow and red light.

Moreover, whilst an embodiment has been described in which the luminescent surface as a whole of the TS panel is changed over to the same color as those of the signal in synchronisation with the signal, the TS panel may be controlled to turn-on and turn-off or vice versa in synchronism with the red lamp.

Alternatively, the TS panel may be controlled to turn-on and turn-off or vice versa in synchronisation with the green or yellow lamp. In a further embodiment, the information etc. could itself change color in

synchronisation with at least one lamp of the traffic signal. In yet another embodiment of the invention, the whole of the surface of the panel could operate in synchronisation with at least one lamp of the traffic signal.

As has been described hereinbefore, in the display system for the traffic signal embodying the present invention, the display means which displays information including traffic information, traffic slogans and advertisements and the like is changed over to the same color as the lamps of the traffic signal or turned on in synchronism with the red lamp thereof. Therefore, the display system can function as an auxiliary signal in which the signal color can be observed easily by driver and pedestrians.

Moreover, the display system is positioned where it can be easily observed substantially simultaneously with the traffic signal. Therefore, a display system with effective advertisements can be provided to communicate various information to drivers and pedestrians.

Further, in the display system for the traffic signal, the display means is completely separate from the electrical system of the traffic signal, so that any electrical circuits of the traffic signal need not be changed. Therefore, the safety of the traffic signal is secure.

Next, a detailed description will be given of another embodiment of a traffic signal according to this invention.

A color luminescent display panel 110 is shown in Fig. 6 which is arranged to display the traffic signal. The display panel is a color plasma display panel. This panel 110 is supported by a supporting pole 112 of an electric pole not shown.

The panel 110, as shown in Fig. 7, is controlled by a controller 114 and a panel drive circuit 116. The controller 114 contains a timer and outputs control

signals via the panel drive circuit 116 which change the luminescent panel 110 to green, yellow and red at predetermined times, for example successively. The panel drive circuit 116 makes the surface of the whole of the luminescent panel 110 appear in color specified by the control signals in response to the input control signals.

With this arrangement, the luminescence surface as a whole of the luminescent panel 110 has one color. Therefore, when the above-mentioned traffic signal is compared with a conventional one of the same size, the luminescent area will be three times bigger, so that the visibility is improved.

Fig. 8 shows another embodiment of a traffic signal. The luminescent panel 110 is divided into a display part 110A for a left-turn, another display part 110C for a right-turn and a further display part 110B for straight ahead. These three display parts 110A, 110B and 110C are controlled independently. At the center region of the respective display parts 110A, 110B and 110C, there are respective arrow marks. Arrow mark 111A indicates a left-turn, arrow mark 111B indicates straight ahead and arrow mark 111C indicates a right-turn. These arrow marks are white and luminescent. Between the respective display parts 110A, 110B and 110C, white lines 111D and 111E are always displayed.

The background colors of the respective display parts 110A, 110B and 110C are changed over to green, yellow and red independently of each other according to whether travel in the direction indicated by the arrow marks 111A, 111B and 111C is permitted.

For instance, when a left-turn, travel straight ahead, and a right-turn are all allowed, all the background colors of display parts 110A, 110B and 110C are green and luminescent. When a left-turn and travel straight ahead are no longer permitted and a right-turn is only allowed, the background colors of the display

parts 110A and 110B are red and luminescent and that of display part 110C is luminescent and green.

Fig. 9 shows a timing chart which illustrates the change-over timing of the green, yellow and red lights in the above-mentioned embodiment. The green luminescent period for a right-turn is longer than that for a left-turn and the travel straight ahead as shown in Fig. 9. For instance, at time t_1, the left-turn and the straight ahead are red and only the right-turn is green.

The control of the background colors of the respective display parts 110A, 110B and 110C in the above-mentioned luminescent panel 110 can be performed by the controller 114 and the panel drive circuit 116 shown in Fig. 17. Whilst the present embodiment has one luminescent panel 110 divided into three display parts 110A, 110B and 110C which are controlled independently, the present invention is not necessarily be limited to this, and three separate luminescent panels, which correspond to the respective display parts may be used.

The display panel may be of any suitable form instead of the color plasma display panel described above. For example a fluorescent display tube, a luminescent diode panel or a liquid crystal display may also be used. Moreover, the method for dividing the luminescent panel is not to be limited to dividing the panel into the number of directions in which vehicles can proceed eg. a left-turn, a straight ahead, a right-turn and the like. The luminescent panel may be divided into the same number as there are lanes on a road to display a signal for each respective lane.

As has been described hereinbefore, in a traffic signal embodying the present invention, the luminescent surface as a whole can be changed over to green, yellow and red successively in a predetermined timing. Therefore, the luminescent area is larger than that of a similarly sized conventional traffic signal.

Furthermore drivers and pedestrians can see and understand the signal more easily due to its reduced complexity. Moreover, in another embodiment, the luminescent surface is divided into the number of lanes on the road or into three portions for a left-turn, straight ahead and a right-turn. In the latter case, each luminescent portion has an arrow mark indicating the respective direction eg. a left-turn, straight ahead and a right-turn. The backgrounds of the arrow marks are successively changed over to green, yellow and red colors with a predetermined timing. Therefore, it can be easily determined whether a specific lane or a specific direction can proceed by looking at only one luminescent surface. This is much simpler than the conventional traffic signal which uses arrow marks.

A detailed description will now be given of one embodiment of a hood for a lamp of a traffic signal. Fig. 10 shows a traffic signal 212 which has hoods 210 for the lamps of the traffic signal. The hoods 210 are installed on a display board 214 of the traffic signal 212. The display board 214 is attached to a support 216 via an arm 218. The lenses 220, for the red, green and yellow lamps are disposed on the display board 214. The hoods 210 are mounted individually around these lenses 220. Ventilation openings 228 for allowing the passage of air are formed on both sides of each hood 210.

Fig. 11 is a view of one of the above-mentioned hoods 210 when flat. Each hood 210 is formed from a thin and almost rectangular iron plate. At the top portion of this figure, outwardly extending projections 224, having bolt openings 222 are formed. These projections 224, are bent about the lines of bending 226. The position of the projections when bent are shown by dot-dash lines in Fig. 11 and are bent by about 90° when the hood 210 is mounted on the display board 214. The hood 210 is curved in a cylindrical-like manner to enclose the lens 220. The respective

projections 224 are forced against the display board 214 so that the respective bolt openings 222 of the projections 224 line up with screw holes, not shown, formed on the display board 214. The hood 210 is fixed to the display board 214 by bolts which pass through the screw holes and the bolt openings 222 on the hood.

Three ventilation openings 228, are formed on both the right and the left side parts of the hoods near the base end 210A. The ventilation openings 228 are each formed by pushing outwardly a L-shaped part 230 of the hood. Part 230A partially covers the ventilation opening 228. Air is thus prevented from being trapped by the hood as can be clearly seen from Fig. 12. Accordingly when the wind blows in the direction of the lenses 220 on the display board 214, the wind escapes via the ventilation openings 228 to the outside thereof. Therefore, since the wind is not trapped around the display part, the traffic signal is not damaged or bent by the wind pressure. Moreover, since the plate 230A which is part of the L-shaped part 230 of the ventilation opening 228 acts as a cover, it can prevent direct sunshine and rain from entering the ventilation openings 228 and reaching the lens 220.

Fig. 13 shows another embodiment of a hood for signal light. The hood 234 is formed from a thin and almost rectangular iron plate as with the previous embodiment. Parts which are the same as in the hood 210 are identified by the same reference numerals.

The base end 234A of the hood 234 have been cut away further than the bending lines 226 of the projections 224. The cut-away portions 236 are rectangular, as shown in Fig. 13. The cut-away portions 236 are located behind the lenses 220, as shown in Fig. 14, when the hood 234 is mounted on the display board 214. With this arrangement, a slit 238 is formed by the display board 214 and the cut-away portion 236. Moreover, the or each lens 220 is mounted to the display

board 214 via a lens stand 240 which has a width t more which is smaller than the width T of the cut-away portion 236.

With this hood 234, the wind escapes via slits 238. Therefore, the wind pressure blowing on the lens 220 decreases. With this hood, the traffic signal is not damaged by wind pressure. Moreover, the lens 220 is protected from direct sunshine passing through the slit 238 by the lens stand 240.

Fig. 15 shows a further embodiment of a hood. The hood 242 is formed from a thin and almost rectangular iron plate as in the two previous embodiments. The parts which are the same as in the previous embodiments have been given the same reference numerals. Ventilation openings 244 are punched by a press at the right and the left side parts near the base end 242A of each hood 242. When the hood 242 is mounted on the display board 214, the ventilating openings 244 face the ground.

With this hood 242, the wind is directed away from the ventilation openings 244. Therefore, the wind pressure blowing on to the lens 220 is decreased. Moreover, since the ventilation openings 244 face the ground, they can prevent direct sunshine and rain from reaching the lens 220 via the ventilation openings 244.

Whilst three preferred forms of ventilation opening 228,236,244 have been described, the present invention is not necessarily be limited to these, and any suitable form of ventilation openings which direct the wind away can be used.

Moreover, the hoods need not be applied to traffic signals having three signal lamps and can be applied to any type of traffic signal.

As has been described herein before, the ventilation openings formed on the hood for the lamp of a traffic signal can prevent the traffic signal from being damaged and bending the traffic signal as a result

of wind pressure.

It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the invention is to cover all modifications, alternate constructions and equivalents falling within the scope of the invention as expressed in the appended claims.

Claims

1. A traffic signal comprising:

surface luminescent means, in which the whole luminescent surface is divided into a plurality of surfaces, there being an arrow mark for indicating the direction of travel permitted, at the center portions of the respective luminescent surfaces, the backgrounds of said arrow marks being changeable to three luminescent colors comprising green, yellow and red; and

luminescent control means for successively changing the luminescent colors of the backgrounds of the surfaces to green, yellow or red.

2. A traffic signal as claimed in claim 1, wherein the backgrounds of the plurality of surfaces can change color independently of each other.

3. A traffic signal as claimed in claim 1 or 2, wherein said surface luminescent means has the luminescent surface thereof divided into the same number as the number of lanes of the road.

4. A traffic signal as claimed in claim 1 or 2, wherein said surface luminescent means has the luminescent surface thereof divided into the same number as the number of directions, in which a vehicle can proceed.

5. A traffic signal as claimed in any one of claims 1 to 4, wherein said surface luminescent means makes said arrow marks luminescent in a white color for display thereof.

6. A traffic signal as claimed in any one of claims 1 to 5, wherein said surface luminescent means is a color

plasma display panel.

7. A traffic signal as claimed in any one of claims 1 to 5, wherein said surface luminescent means is a fluorescent display tube.

8. A traffic signal as claimed in any one of claims 1 to 5, wherein said surface luminescent means is a luminescent diode panel.

9. A traffic signal as claimed in any one of claims 1 to 5, wherein said surface luminescent means is a liquid crystal display.

10. A traffic signal substantially as hereinbefore described with reference to Figures 8 and 9 of the accompanying drawings.

The Patent Office

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Application No:	GB 9603684.3	**Examiner:**	Mike Davis
Claims searched:	1-10	**Date of search:**	26 March 1996

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4Q(QAH), G5C(CAB,CEP)

Int Cl (Ed.6): G08G 1/095,1/0955

Other: Online: WPI,INSPEC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	None	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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